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INSTRUCTIONAL NOTES

ON THE

VICKERS GUN.

ISSUED BY THE GENERAL STAFF.

N.B.—Heavy Type applies to GROUND GUN only.

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INSTRUCTIONAL NOTES

ON THE

VICKERS GUN.

INSTRUCTIONAL NOTES

ON THE

VICKERS GUN.

NOTE.—The following sub-heads and notes should be read in conjunction with the official copy of the "Handbook for the ·303 Vickers Machine Gun."

SUB-HEADS OF TRAINING.

1. Hints for Squad Instructors.
2. General Description.
3. Mechanism.
4. Care and Cleaning.
5. Stripping.
6. Points Before, During, and After Flight (or Range Practices).
7. Spare Parts.
8. Immediate Action.
9. Causes of Stoppages, and Setting up Gun.
10. Examination of Gun.
11. Repairs and Adjustments.
12. Testing of Ammunition.
13. Preparation of Link-Belts: Use of the Loading-Strip.
14. Ammunition Boxes and Chutes.

I.—HINTS FOR SQUAD INSTRUCTORS.

(1) Always inform squad what is the subject of instruction, and the object of the lesson.

(2) Make sure that every member of the squad fully understands each item or part of the subject, before proceeding to the next.

(3) Talk to the squad, not to the gun.

(4) Do not shout; talk just loud enough for all the squad to hear.

(5) Illustrate each point as you explain it; do not try to explain without the use of a diagram anything that cannot be seen.

(6) Be brief; do not dwell upon non-essentials.

(7) Always have kit ready to commence each lesson at the hour appointed.

(8) Keep a record of the progress made by every member of the squad.

(9) Make yourself acquainted each evening with the next day's work, and prepare your instruction carefully.

(10) The success of a squad depends largely on the zeal and ability of the instructor.

(11) The method of instruction should, wherever possible, be based on the following sequence:—

(*a*) Demonstration.
(*b*) Explanation.
(*c*) Imitation.
(*d*) Interrogation.

II.—GENERAL DESCRIPTION OF GUN AND PARTS.

SEQUENCE OF TEACHING: HEADINGS FOR INSTRUCTORS.

Name of gun.
Weight of gun.
Gun consists of recoiling and non-recoiling portions. (The instructor should separate the two groups for the benefit of the squad.)
Name the chief parts comprising each group.
What forces work the gun.
Rate of fire.

BARREL CASING.

Exterior:
Made of steel.
Parts cut away for cooling.
Muzzle attachment.
Screwed hole for packing.
Head of steam tube; importance of keeper screw.
(N.B.—No need to go into details of steam tube.)
Steam escape hole.
Emptying hole.
Filling hole.
Barrel bearing.
Seating for ejection.
Crosshead bracket.
Ring-sight.

Interior:
Water capacity.
Interior tinned.
Steam tube (by means of diagram only). N.B.—Keeper screw.
Barrel guides, and reason for them.

(14004.) Wt. W 1254—G 115. 5000. 11/17. D & S. G. 2. P. 17/902.

Breech Casing.

Explain connection between barrel casing and breech casing.

Exterior.

Right side:
- Cut away portion for feed block.
- Check lever (not absolutely necessary for firing gun).
- Slot for crank bearings to move in.
- Slide for partially closing slot.
- Roller; collar; split pin.
- Hole for T-fixing pin.

Left side:
- Cut away portion for feed block.
- Studs for fusee spring box.
- Fusee box and spring. Explain how spring is attached to adjusting screw and fusee chain, and how tension is altered.
- Front cover catch.
- Slot for crank bearings to move in.
- Slide for partially closing slot.
- Hole for T-fixing pin.

Bottom Plate:
- **Elevating bracket.**
- **Sliding shutter.**
- **Sliding shutter catch.**

Rear Crosspiece:
- How secured, and fastened by T-fixing pin.
- **Handles with oil and brushes.**
- **Safety catch and spring.**
- **Firing lever and pawl.**

Front Cover:
- How secured by hinged pin.
- How closed and fastened.

Rear Cover:
- How secured by hinged pin.
- Rear cover lock.

Interior.

Front Cover:
- How claws engage front cover catch.
- Extractor stop and reason for it.

Rear Cover:
- Cover lock. (Note engagement when cover is down.)
- Cover lock spring.
- **Trigger bar, and how kept in position.**
- **Trigger bar spring.**

- Lock guides.
- Ramps.

Right and Left Side Plates:
- Cams.
- Steps on rear end of cams.

Rear Crosspiece:
- **Trigger bar lever, and how actuated.**

Feed Block:
- Bottom lever and reason of stud.
- Connection between bottom lever and top lever.
- Slide, and how worked by levers.
- Top pawls, and difference between them, with reason.
- Top pawl spring.
- Cartridge and bullet stops.
- Extractor clearance.
- Steel rib, with reason.
- Cartridge guide.
- Bottom pawls.
- Bottom pawl spring and split axis pin.

Recoiling Portions.

Muzzle Cup:
- Screwed; .05 washer.

Barrel:
- Why browned.
- Why threaded.
- Canelure for asbestos packing. (N.B.—Never use string.)
- Barrel block and trunnions.
- Interior: (1) Grooves; (2) Lands; (3) Lead (between chamber and grooves); (4) Chamber.

Right and Left Side Plates and Attachments:
- Prolongation on left side plate.
- Holes for trunnions.
- Side plate springs.
- Lock guides and interruptions.
- Crank stops.
- Crank bearings.
- Crank shaft.
- Crank handle.
- Extension for prevention of dust, grit, etc.
- Crank.
- Crank pin.
- Connecting rod.
- Adjusting nut and washer.
- Interrupted flange.
- Fusee and chain.
- Fusee stem and lugs.

Lock:

Side lever head.
Side levers, axis bush and split pin .
Extractor levers, and bents on them.
Extractor: gib, gib-spring, and cover; horns of extractor.
Extractor stop.
Extractor lever stop.
Tumbler and tumbler axis pin. (N.B. feather.)
Trigger and trigger axis pin.
Lock spring.
Firing pin.
Sear and spring.
Lock casing.

BELT.

Types of Links:

Mark I.
Mark II.
Prideaux.

III.—THE TEACHING OF MECHANISM.

A service lock must always be in the gun when firing ball ammunition. For instructional purposes, when ammunition is not being fired, a D.P. lock should be used.

At every stage of the work the gun must be correctly set up to represent the actual firing conditions.

The following is the correct sequence in which instruction in mechanism should always be given: each stage must be thoroughly understood before the next stage is attempted.

(1) How to load.
(2) How to fire.
(3) How to unload.
(4) Force of explosion (action of recoil).
(5) First action in feed block.
(6) Rotation of crank (backward).
(7) Second action in feed block.
(8) Backward movement of lock.
(9) Cocking of lock.
(10) Action of fusee spring.
(11) Forward movement of lock.
(12) Firing action—first shot.
(13) Firing action—subsequent shots.
(14) Cease fire.
(15) Unload (taken without detail).
(16) Gun clear.

KIT REQUIRED.

(1) Gun (mounted on some form of mounting, and having a D.P. lock).
(2) Articulated links.
(3) Dummy cartridges.
(4) Empty case (dummy without bullet).
(5) Spare lock.
(6) Spare feed block.
(7) Brass or wooden or skeleton lock.
(8) Instructional diagrams.

(1) HOW TO LOAD.

(*Without loading-handle.*)

(a) *Demonstration:*
Load.

(b) *Explanation:*
Link-belt inserted.
Crank handle pulled back till lock is hung.
Recoiling portions drawn back.
Crank handle pulled on to roller and released.
Last three processes repeated.
One cartridge in chamber; one gripped by extractor.
Gun ready for firing.

(c) *Squad practice.*

(d) *Interrogation.*

(*With Loading-handle.*)

(a) *Demonstration:*
Load.

(b) *Explanation:*
Link-belt inserted.
Loading-handle manipulated.
Loading-handle again manipulated.

(c) *Squad practice.*

(d) *Interrogation.*

(2) HOW TO FIRE.

(a) *To set up gun:*
Fully load.

(b) *Demonstration:*
Press thumb-piece.

(c) *Explanation:*
Safety catch raised.
Thumb-piece pressed.

Should pressure be released before belt runs out, the extractor will be gripping a live round in the feed block, and a live round in the chamber.
Should belt run out before pressure is released, there will be nothing left on the extractor.

(d) *Squad practice.*

(e) *Interrogation.*

(3) How to Unload.

(a) *To set up gun:*
Fully load.

(b) *Demonstration:*
Unload.

(c) *Explanation:*
Crank handle is pulled twice on to roller and released.
No movement of recoiling portions.
No action in feed block.
Thumb-piece pressed.
Belt removed.

(d) *Squad practice.*

(e) *Interrogation.*

(4) Force of Explosion (Action of Recoil).

(a) *To set up gun:*
Remove outer casing of muzzle attachment.
Put empty case in chamber.
Put dummy in feed block.
Remove fusee spring.
Raise rear cover.

(b) *Demonstration:*
Push back recoiling portions from the front.

(c) *Explanation:*
Explosion.
Action of gases in muzzle attachment.
Recoiling portions driven back one inch.
Fusee spring extended.

(d) *Squad practice.*

(e) *Interrogation.*

(5) First Action in Feed Block.

(a) *To set up gun:*
Remove outer casing of muzzle attachment.
Put empty case in chamber.

Put dummy in feed block.
Remove fusee spring.
Raise front cover.

(b) *Demonstration:*
Push back recoiling portions from the front.
Use diagrams.

(c) *Explanation:*
Stud on lower lever.
Recess in prolongation of left sideplate.
Bottom lever acting on top lever.
Slide moving from left to right.
Top pawls engaging cartridge held by lower pawls.

Note.—Further explanation to be given with feed block removed from gun, and containing one dummy.

(d) *Squad practice.*

(e) *Interrogation.*

(6) Rotation of Crank.

(a) *To set up gun:*
Remove outer casing of muzzle attachment.
Put empty case in chamber.
Put dummy in feed block.
Take off fusee spring.
Raise rear cover.

(b) *Demonstration:*
Push on muzzle cup till crank handle is vertical: then push on face of lock.

(c) *Explanation:*
Tail of crank handle on roller.
Crank rotates.
Lock is withdrawn.
Fusee spring is further extended.
Momentum of lock, &c., causes crank to rotate further.
Barrel and sideplates travel forward.
Lock still travels back for one inch, and then goes slightly forward.
Barrel and sideplates are now home.

(7) Second Action in Feed Block.

(a) *To set up gun:*
Remove outer casing of muzzle attachment.
Perform half loading motions.
Remove fusee spring.
Draw back recoiling portions.
Raise front cover.

(b) *Demonstration:*
Force recoiling portions forward.
Slide moves from right to left.

(c) *Explanation* (with feed block and two dummies, or diagrams):
Recess.
Stud on lower lever.
Bottom lever acting on top lever.
Slide moving to left.
Top pawls: fresh cartridge.
Cartridge guides.
Cartridge and bullet stops.
Bottom pawls depressed.
Bottom pawls rise behind second cartridge.

(d) *Squad practice.*

(e) *Interrogation.*

(8) Backward Movement of Lock.

(a) *To set up gun:*
Remove outer casing of muzzle attachment.
Put empty case in chamber.
Put dummy in feed block.
Remove fusee spring.
Raise rear cover.

(b) *Demonstration:*
Action of lock moving backwards.

(c) *Explanation:*
Withdrawal of live round from feed block.
Withdrawal of empty case from chamber.
Horns travelling on cams.
Ramps forcing down extractor.
Empty case probably falls off.
Live round opposite chamber.
Live round, how kept on.

(d) *Squad practice.*

(e) *Interrogation.*

(9) Cocking of Lock.

(a) *To set up gun:*
Put empty case in chamber.
Put dummy in feed block.
Press thumb-piece.
Raise rear cover.

(b) *Demonstration:*
With lock in gun.
With brass or wooden lock.

(c) *Explanation* (with brass or wooden lock, diagrams, or spare parts):
Upward movement of side lever head.
Rotation of tumbler.
Firing-pin withdrawn.
Compression of lock-spring.
Nose of trigger. Bent of tumbler.
Bents of sear and firing-pin.

(d) *Squad practice.*

(e) *Interrogation.*

(10) Action of Fusee Spring.

(a) *To set up gun:*
Half load.
Hang lock.
Draw back recoiling portions.
Remove fusee spring box, holding it in left hand.
Pull back crank handle, and hold with right hand.
Have rear cover up.

(b) *Demonstration:*
Show unwinding of fusee chain by pushing forward fusee spring box, allowing crank handle to go slowly forward.

(c) *Explanation:*
Connection of fusee spring and chain to crank.
Downward movement of connecting rod and side lever head.
Lock forced to continue forward movement.

(d) *Squad practice.*

(e) *Interrogation.*

(11) Forward Movement of Lock.

(a) *To set up gun:*
Half load.
Hang lock.
Draw back recoiling portions.
Remove fusee spring box, holding it with left hand.
Pull back crank handle, and hold with right hand.
Have rear cover up.

(b) *Demonstration:*
Outside action of lock in forward movement.

(c) *Explanation* (using spare lock): flanges, lock-guides,
Live round opposite chamber.

Side levers acting on extractor levers.
Extractor rising.
How empty case (if still on) is forced off.
Bottom projection of gib passing over base of live round in chamber.
Top projection passing over base of round in feed block.
Firing-pin hole opposite cap.
Cartridge gripped in feed block.
Action of sideplate springs.
Further downward movement of connecting rod and side lever head.
Sear depressed.
Breech locked.

(d) *Squad practice.*

(e) *Interrogation.*

(12) Firing Action—First Shot.

(a) *To set up gun:*
Load.

(b) *Demonstration:*
Use brass or wooden lock, spare parts, or diagrams.
On gun, firing first shot.

(c) *Explanation:*
1. With brass or wooden lock:
Bents of sear and firing-pin.
Lock spring taking forward firing-pin.
Nose of trigger. Bent of tumbler.
2. On gun:
Pressing of thumb-piece.
Pawl on firing-lever.
Action of trigger bar lever.
Trigger bar drawn to rear.
Tail of trigger drawn back.
3. With brass or wooden lock:
Nose of trigger disengaged from bent of tumbler.
Action of long arm of lock spring.
Firing-pin explodes charge.

(d) *Squad practice.*

(e) *Interrogation.*

(13) Firing Action—Subsequent Shots.

(a) *To set up gun:*
Load.

(b) *Demonstration:*
With brass or wooden lock, spare parts, or diagrams.

(c) *Explanation:*
Pressure kept on thumb-piece.
Trigger bar held to the rear.
Tail of trigger tripped each time before lock is home.
Nose of trigger and tumbler.
Depression of sear.
Action of lock spring.
Timing of sear.

(d) *Squad practice.*

(e) *Interrogation.*

(14) Cease Fire.

(a) *To set up gun:*
Load.

(b) *Demonstration:*
1. **With gun: Trigger bar action on release of pressure.**
2. With brass lock or spare parts: Action of trigger.

(c) *Explanation:*
Safety catch spring and trigger bar lever.
Trigger bar spring and trigger bar.
Sear depressed.
Firing-pin held by trigger and tumbler.

(d) *Squad practice.*

(e) *Interrogation.*

(15) Unload.

(as in Section 3).

(16) Clear Gun.

(a) *To set up gun:*
Have gun unloaded.

(b) *Demonstration:*
Action of clearing gun.

(c) *Explanation:*
Pull back crank handle.
Raise rear cover.
Raise lock clear of guides.
Report "Gun clear."

(d) *Squad practice.*

(e) *Interrogation.*

IV.—CARE AND CLEANING.

(1) Importance of subject.
(2) Instructional kit required for teaching.
(3) General points.
(4) Wear in the bore.
(5) High polish of interior of new barrel.
(6) Kinds of fouling.
(7) Removal of fouling:
    (*a*) Internal,
    (*b*) Superficial,
    (*c*) Metallic.
(8) Daily cleaning.
(9) Weekly cleaning.
(10) How to use the cleaning rod.
(11) How to put on a gauze.
(12) How to use the double pull-through.
(13) Cleaning with boiling water.
(14) Barrels: packing for store.

1. Importance of Subject.

Careful attention should be given to this branch of the instruction, in order that the gun may fulfil to the utmost of its power any task demanded of it from a mechanical point of view, and in order to obtain the maximum results when fire is applied.

2. Instructional Kit required for Teaching.

Gun.
Spare parts.
Spare barrel.
Links.
Dummy cartridges.
Cleaning rod.
Double pull-through.
Gauze.
Flannelette and old linen.
Lubricating oil, turps, and paraffin.
Barrel reflector.
Spring balance.
Boiling water.

3. General Points.

The instructor should explain the necessity of the following:—

(*a*) Guns should be examined daily after cleaning.
(*b*) Avoid damage to gun through careless handling.

(*c*) Never play with the crank handle unless the lock is in the gun. The reason for this is that the interrupted flange of the connecting rod dents the bottom plate.
(*d*) Never keep the lock spring compressed unnecessarily.
(*e*) **See that the milled head brushes are kept secure.**
(*f*) See that all points taught in Stripping and Examination of Gun are observed.
(*g*) The browning on the barrel and gun must be preserved, as it is a protection against rust.

4. Wear in Bore.

Wear in the bore of machine guns is due to three causes:—

(*a*) The friction of the bullet.
(*b*) The heat generated when ammunition is fired.
(*c*) The friction of the pull-through gauze when the bore is being cleaned.

Undue wear is caused by improper and unnecessary use of the pull-through gauze, to prevent which it is most important that instructions for cleaning be adhered to.

5. High Polish of Interior of New Barrel.

The interior of a new barrel carries a high polish, and this is a safeguard against rust and metallic fouling, but it must be recognised that as the bore becomes worn this polish will diminish. Efforts to restore it with wire gauze on the pull-through result in unnecessary wear. But though the polish may diminish, it must be understood that the lands should be bright and free from stain of rust or fouling.

6. Kinds of Fouling.

In order that the instructions for cleaning may be understood, it is essential that the causes of fouling in barrels should be briefly explained.

Fouling may be said to be of three kinds:—

(*a*) *Internal*—caused by the forcing of the products of combustion into the pores of the metal.

(*b*) *Superficial*—caused by the deposit in the bore of the solid products of the charge and of the cap composition.

(*c*) *Metallic* (Nickelling)—caused by a portion of the cupro-nickel envelope of the bullet being left on the bore. It appears as a whitish streak on the lands, or as a roughness on the edge of the grooves. If

deposited near the muzzle or the breech, it is visible to the eye when the bore is clean, but it can only be detected in the centre of the bore by use of the gauge plug. It is a cause of inaccuracy, and, if the gun shoots badly for no apparent reason, its presence should be looked for as a possible explanation.

7. Removal of Fouling.

Fouling may be removed by the following means:—

(*a*) *Internal fouling.*—This may be removed satisfactorily by the use of boiling water. If for any reason this method cannot be used, the barrel will "sweat," and a hard black crust of fouling will appear in the bore. This will turn to red rust if not removed, and the barrel will then require repeated cleanings with flannelette and with gauze, for a time that will vary according to climatic conditions and the state of the bore.

(*b*) *Superficial fouling.*—This is readily removed when warm by the use of a cleaning-rod and flannelette, but if it is allowed to remain long in the barrel it will become hard, and will have a corrosive effect equal to that produced by internal fouling.

(*c*) *Metallic fouling.*—This is removed by the use of the double-pull-through, or by Kynoch's Nickel Solvent.

8. Daily Cleaning.

The outside of the gun should be cleaned daily, all parts of the mechanism being wiped with an oily rag. The bore will always be left oily.

To clean the mechanism, a mixture of equal parts of oil, lubricating, G.S., and paraffin should be used. If any parts are clogged with dried oil, spirits of turpentine should be used to remove it. After each part is cleaned, it should be thoroughly dried and slightly oiled. The lubricating oil used in warm weather should be a mixture of equal parts of G.S. and P. 924, while in cold weather P. 924 alone should be used.

Hanging the lock and moving the recoiling portions by working the crank handle affords a ready means of oiling the recoiling portions and the bearing parts of the barrel, *i.e.*, just in front of the trunnion block (which can be got at by removing the feed block), and, at the muzzle end, in front of the packing gland.

When paraffin has been used, all traces of it should be thoroughly removed, for paraffin, though an efficient agent for removing rust, does not prevent its formation.

How Taught.

(a) *Demonstration:*
Cleaning of exterior.
Hanging lock.
Oiling of working parts.

(*b*) *Explanation:*
Removal of clogged or dried oil.
Drying after cleaning.
Amount of lubricating oil used after cleaning.

(c) *Squad practice.*

(d) *Interrogation.*

9. Weekly Cleaning.

The gun should be thoroughly overhauled and cleaned each week. The oil should be removed from the bore, and replaced by fresh oil. In cases where the bore has once become rusty, it should be wiped out with flannelette, and then cleaned with the gauze on the pull-through.

10. How to Use the Cleaning Rod.

(a) *Demonstration.*

(b) *Explanation:*
Remove outer casing of muzzle attachment, and muzzle cup.
Raise rear cover.
Lift out lock and rest it on rear cover, or remove it if considered necessary.
Insert a piece of oily flannelette in the eyelet of the cleaning rod. (Demonstrate how oil is worked into flannelette with fingers; the size of the flannelette is slightly less for oiling.)
See that flannelette surrounds the cleaning-rod.
Insert cleaning rod from muzzle, and fix the movable bush.
Work rod forwards and backwards centrally with axis of bore.
If rod is difficult to withdraw, no cross strain must be applied, otherwise rod will snap.
Remove oily flannelette, and replace it by dry flannelette 4 inches by 2.
Finally leave bore slightly oiled.

N.B.—Flannelette used for cleaning purposes need not be thrown away; if washed, it is again quite serviceable.

(c) *Squad practice.*

(d) *Interrogation.*

11. How to put on a Gauze.

As the instructor has already explained that it is necessary, in the case of a rusty barrel, to use the gauze in weekly cleaning, he must now proceed to teach how the gauze is put on the pull-through.

Wire gauze in pieces $2\frac{1}{2}$ inches by $1\frac{1}{2}$ inches is supplied, and should be used for the removal of hard fouling or of rust. In attaching it to the pull-through, the following principles should be applied:—

(a) *Demonstration.*

(b) *Explanation:*

In attaching the gauze to the pull-through, turn the shorter sides towards the upper, so that the longer sides take the form "S." Open the loop of the pull-through, and put one side of it in each loop of the "S." Then coil each half of the gauze tightly round the portion of the cord over which it is placed, till the two rolls thus formed, meet.

The object of the gauze is mainly to scour out the grooves, and it should therefore fit the bore tightly. When it fails to do this, it should be partially unrolled and packed with paper or flannelette, to increase its bulk.

Grit must be removed from the gauze and pull-through before use, and the gauze should be thoroughly oiled.

Cleaning with gauze entails wear of the bore. Gauze should therefore not be pulled through the barrel more often than is laid down here, without sufficient cause. The surest way of preventing the necessity of the continued use of gauze is to keep te bore well oiled, so as to prevent rust. A barrel which has become rusty will always be more liable to rust than one which has been kept in good condition. It will therefore require more attention, and more frequent cleaning with gauze. Similarly, a barrel in which erosion has commenced will require more care than one of which the surface has not been attacked, for, the corroded portion being rough, moisture is more likely to collect on it and form rust. It is also more difficult to remove rust thoroughly from a rough surface than from a smooth one.

(c) *Squad practice.*

(d) *Interrogation.*

12. How to Use the Double Pull-through.

Place gunmetal protector on muzzle to keep cord central. Fix the barrel in a vice, or have it held firmly by one man, while two others, helping with their free hands to keep the barrel steady, pull the cord backwards and forwards until the fouling or rust is loosened. When the gauze is worn out, it should be replaced by one of the spare pieces which are issued with each double pull-through.

Note.—With the Perivale barrel holder, only two men are needed.

When signs of wear appear, a new cord should be taken into use, to avoid the risk of the pull-through breaking in the bore. If a breakage does occur, the barrel must be taken at once to the armourer. No attempt should be made by the gunner to remove the obstruction.

(a) *Demonstration* (with the assistance of the squad).

(b) *Explanation:*

Removal of barrel necessary.
Fixing on of muzzle protector.
How pull-through is inserted.
How barrel is held steady.
Necessity of pulling cord centrally with axis of bore; and neglect of this.
Subsequent cleaning, with rod and flannelette.
Use of muzzle protector.

(c) *Squad practice.*

(d) *Interrogation.*

13. Cleaning with Boiling Water.

An effective means of cleaning the bore, whether firing has taken place or not, is found in the use of boiling water. Before this is used, superficial fouling and grease should be removed. About 5 or 6 pints should be poured through the bore from the breech, a funnel being used for the purpose. Before this is done, the barrel should be removed from the gun. The bore should then be thoroughly dried and oiled. Not only does the boiling water remove the fouling, but the expansion of the metal, due to the heat of the water, loosens any rust there may be, and makes it easily removable.

How Taught.

(a) *Demonstration.*

(b) *Explanation.*

(c) *Squad Practice.*

(d) *Interrogation.*

14. Barrels: Packing for Store.

When guns are returned to store, packed for transmission, or stowed away in any place where they cannot be readily examined, the barrels and unpainted parts should be coated with "Composition, preserving, arms." The mixture is to be made hot, and a piece of flannel dipped in it, with which the exterior parts will be dabbed. To coat the inside of the barrels draw a bunch of lamp cotton, well saturated with the mixture, through from both ends. The lamp cotton is to be attached to a piece of twisted copper wire.

V.—STRIPPING.

General Points.

(1) No time limit will be imposed; ability to strip a part correctly (or, in the case of instructors, to teach how it should be stripped correctly) will form the basis of all stripping examinations.

(2) Use correct tools, *e.g.*, screwdrivers according to size of screw, correct punches, &c. If this rule is not observed, screws get burred, and can only be removed by an armourer.

(3) Before attempting to withdraw screwed axis pins, make certain that the threads of the screw are fully unscrewed.

(4) When replacing screwed axis pins, do not use force. The threads will engage without the use of unnecessary pressure. If this rule is not observed, the threads (which are extremely fine) will become so burred that it will be impossible to replace the pin, *e.g.*, Cover lock screwed axis pin.

(5) When raising rear cover, do not throw it upwards: lift it. Improper treatment may easily strain it on its hinges. Before lowering the cover, see that the lock is properly placed in the gun, and that the Foroto rear cover catch is clear.

(6) Before closing down the front cover, see that the feed block is correctly in position, the slide as far over to the left as it will go, and the front cover catch raised.

(7) With reasonable care, defects and breakages should be of extremely rare occurrence. They are simply due to the neglect of ordinary precautions.

Detail of Stripping the Gun.

(1) *Outer Casing of Muzzle Attachment:*
Withdraw the split pin securing the outer casing of the muzzle attachment to the packing gland. Give the outer casing one-sixth of a turn and remove it.

(2) *Muzzle Cup:*
Unscrew the muzzle cup, using the combination tool. Take care that the ·05 washer is not dropped out.

(3) *Feed Block:*
Lift up front cover catch. Raise front cover, and take out feed block.

(4) *Lock:*
Pull crank handle on to roller; raise rear cover; grasp lock, holding extractor down at its lowest point by means of the forefinger. Let crank handle go forward slowly till lock is released from sideplates. Give lock one-sixth of a turn and lift it out.

(5) *Fusee Spring Box:*
With the right hand at the rear, and the left hand at the front, press fusee spring box forward till it is clear of the positioning studs. Then remove it, avoiding side strain on the fusee chain, and disconnect fusee chain from fusee spring.

(6) *Fusee:*
Turn fusee to the rear, till the lugs on its stem are free to be withdrawn. Then pull it out.

(7) *T-Fixing Pin:*
Unscrew three turns, and pull out. Lower rear cross-piece.

(8) *Slides:*
Pull left and right slides out to the rear.

(9) *Recoiling Portions:*
Draw out recoiling portions, and disconnect sideplates from barrel, removing the left one first.
To assemble the gun, the order given above should be reversed.

Detail of Stripping Component Parts.

(1) *Lock:*
See that the lock is fully cocked.
Force out the side lever axis bush split pin.
Take out side lever axis bush.
Slide off side levers and side lever head.
Remove extractor levers.
Take off extractor.

Force out tumbler axis pin.
Take out tumbler.
Release lock spring by depressing sear.
Force out trigger axis pin.
Take out trigger.
Take out lock spring.
Depress sear, and allow firing-pin to slide out.
Move sear 45 degrees, and take out.
To assemble lock, reverse the above, except in the case of the lock spring, which must be forced home with the long arm towards the extractor when the other parts are assembled and the lock is in the fired position.

(2) *Extractor:*
Push out the gib spring cover, and remove gib and spring.

N.B.—The firing-pin should never be released unless the extractor is up against the extractor stop.

(3) *Feed Block:*
Force out the split pin.
Separate the top and bottom levers, using a No. 5 punch.
Take out the slide.
Remove top pawls and spring.
Draw out the bottom pawl axis pin.
Remove bottom pawl spring and pawls.
To assemble feed block, reverse the above.

(4) *Rear Crosspiece:*
Unscrew the firing lever axis pin.
Remove the firing lever.
Unscrew the safety catch axis pin.
Remove the safety catch and spring with piston.
Lift out the trigger bar lever.
To assemble the rear crosspiece, reverse the above order. See that the pawl engages the trigger bar lever.

(5) *Front and Rear Covers:*
Remove keeper pin and check nut.
Force out joint pin.
To assemble, reverse the above.

(6) *Front Cover Catch:*
To remove the spring and plunger, force the plug inward, and give a quarter turn by means of a screwdriver, when the plug will be forced out by the spring. Before removing the plunger, it must be turned so that the slots are free to pass the lugs in the catch. If necessary, by taking out the keeper pin the catch can be taken out.

(7) *Cover Lock:*
Unscrew and take out axis pin
Remove cover lock and spring.
To assemble, reverse the above.

(8) *Trigger Bar.*
Strip cover lock.
Remove trigger bar spring.
Withdraw trigger bar.
To assemble, reverse the above.

(9) *Steam Tube:*
Place the gun on end; so that it stands on the rear end of the breech casing.
Remove the keeper screw.
Unscrew the steam tube, using the special tool provided. (This should not be removed if the valve is moving freely.)

To assemble, reverse the above, taking care that the acorn end is inserted into its thimble in the barrel casing. This is more easily assured by keeping the acorn end in contact with the adjacent channel formed by corrugation of the barrel casing. The tube should screw home freely when in the correct position.

VI.—POINTS TO BE OBSERVED BEFORE, DURING, AND AFTER FLIGHT (OR RANGE PRACTICES).

Before Flight (or Range Practices)—Under the supervision of the Gunnery Officer:

(1) See that the barrel is clean and dry.
(2) Oil frictional parts lightly with P.924 in winter, and a mixture of G.S. and P.924 in summer.
(3) Weigh the recoiling portions (for method, see section on "Repairs and Adjustments"). The gun must be in a horizontal position, and the recoiling portions should not weigh more than 2 lbs.
(4) Weigh the fusee spring (for method, see section on "Repairs and Adjustments"). The tension of the fusee spring should be such as to obtain the maximum fire efficiency of the gun, viz., 600 rounds per minute. This tension should, however, not exceed 12 lbs.

(5) Inspect the muzzle attachment. The disc should be clean and bright. The ·05 washer should be in position, and the muzzle cup clean and screwed on tightly.
(6) See that the gun is accurately fixed upon its mounting.
(7) Examine ammunition chutes and box, to see that they are correctly fitted.
(8) See that the link-belts are correctly prepared, and placed correctly in the ammunition box.
(9) See that the sights are properly harmonised.
(10) Make sure that the loading-handle is correctly fitted, and not hindering the movement of the crank handle.
(11) See that the Foroto spring and rear cover spring are properly fixed.
(12) Check tools and spare parts.
(13) See that the first round is engaged in front of the bottom pawls.
(14) Test the fitting and timing of the gear.
(15) If facilities allow, fire short bursts on the range.

NOTE.—Since the gun is only air-cooled, it must only be fired in short bursts on the ground, time being allowed for cooling between the bursts.

During Flight:

Fire ocasional short bursts to prevent the working parts from becoming clogged by congealed oil.
The gun should be unloaded before landing.

After Flight (or Range Practices)—Under the supervision of the Gunnery Officer:

(1) Unload.
(2) If possible, remove recoiling portions and take them to the armoury, where they should be thoroughly cleaned and then re-oiled.
(3) Clean the non-recoiling portions, removing clogged oil by means of petrol or spirits of turpentine. Then re-oil.
(4) Refill the ammunition box. All unused ammunition must be re-tested.
(5) Examine chutes, to see that they are not damaged or displaced.
(6) Examine sights to see that they are not damaged.
(7) Enquire of pilot if stoppages have occurred, or if any defects have been apparent in the action of the gun. Such defects should be noted and remedied immediately.

VII.—SPARE PARTS.

GENERAL REMARKS.

(1) It is essential to know where to find any spare part that may be required.
(2) All spare parts must be called by their proper names, and the use of fancy names (*e.g.*, butterfly spring) is forbidden.
(3) A list of deficiencies should be kept inside each box.
(4) Spare parts must be kept slightly oiled.
(5) Spare parts should be inspected weekly by the Gunnery Officer.
(6) All deficiencies should be reported at once.

METHOD OF INSTRUCTION.

First Lesson.

Object of lesson: To teach the correct names of spare parts.
The instructor, having laid out on a table or waterproof sheet the whole of the contents of the spare parts box, spare parts case and wallet, will teach his squad as follows:—

(a) *Demonstration:*
Instructor holds up each article in turn (in accordance with the official list of spare parts), and tells squad the correct name given to it.

(b) *Explanation:*
The use of the part under consideration is taught.

(c) *Squad practice:*
When all spare parts have been named and explained by the instructor, the members of the class teach the names and uses in a similar manner.

(d) *Interrogation.*

Second Lesson.

Object of Lesson: To teach the proper method of packing spare parts.

(a) *Demonstration:*
Instructor exhibits to the squad the spare parts box, and spare parts case and wallet, properly packed. He then lays out all parts on table or waterproof sheet, as before.

(b) *Explanation:*
Instructor teaches the number of each particular spare part that is issued per 2 guns, and explains where they are kept, and the method of packing them into the spare parts box, spare parts case or wallet.

(c) *Squad practice:*

All the spare parts are again laid out as already described, and members of the squad teach in a similar manner.

(d) *Interrogation:*

Instructor questions squad as to where spare parts are carried, number carried, how packed, &c.

VIII.—IMMEDIATE ACTION.

Definition:

Immediate action is the immediate application of a probable remedy for a stoppage, based on the position of the crank handle.

General Remarks:

(1) During teaching, guns must be set up to simulate the conditions resulting from the particular stoppage under consideration. This should be done by the instructor, without detail.

(2) The position of the crank handle will act as an indication of the immediate action that is necessary to remedy any particular stoppage. For instructional purposes this position may be looked upon as 1st, 2nd, 3rd or 4th.

(3) The instructor must not deal with the causes of stoppages during the first stages of the teaching in immediate action.

(4) As proficiency is attained, the training should be carried out with the firer blindfolded.

(5) Immediate action must not be considered complete until the gun has been relayed and fired.

(6) Immediate action must be carried out with one hand only.

(7) The instructor should lay stress on the importance of sighting the gun on the target. For this purpose a model aeroplane is found suitable.

(8) It is essential that all kit necessary for the instruction should be prepared before the commencement of the lesson.

Kit Required:

Gun on mounting, or fuselage.
Links.
Dummy cartridges (prepared).
Loading-handle.
Foroto outfit.
Clearing-plug.
Spare lock.
Covering for crank handle.

Method of Instruction:

(1) Give definition, and show the importance of immediate action.

(2) Demonstrate the four positions of the crank handle.

(3) Teach thoroughly each position as follows:—

(*a*) Instructor prepares gun and demonstrates immediate action of 1st position.

(*a*) Instructor prepares gun and demonstrates immediate action of 1st position.
Let go.
Relay.
Fire.

(*c*) Each member of the class now performs immediate action, and the instructor criticises.

(*d*) Instructor questions class.

NOTE.—Only when the class is proficient should the instructor go on to the next phase of the teaching. Exactly the same method and sequence as is given above must be adhered to throughout the whole of the instruction.

A cloth should be used to cover up the crank handle, and removed only when the firer is in position for firing. It is unnecessary to say "Gun stops." If it be required to represent the recurrence of a stoppage, the instructor will proceed to carry out the necessary actions.

Explanation of Immediate Action Table.

The following table of temporary stoppages, set out in five columns, gives a clear indication of the methods to be employed in teaching.

Column 1 shows the four positions of the crank handle when the gun stops firing. The first three positions may vary slightly. The position of the handle affords a ready indication of the correct immediate action in each case, and must be clearly recognised before the instruction proceeds.

Column 2 gives a detailed description of the immediate action to be performed by the firer.

Column 3 deals with the probable causes of the stoppages, but it is of the first importance that the instructor does not proceed to this stage until every immediate action can be correctly carried out without the slightest hesitation.

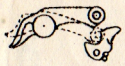
Column 4 gives the method of preventing the occurrence of certain stoppages. They can generally be avoided by a careful examination and preparation of the gun before a flight.

Column 5 shows how the various temporary stoppages can be simulated for instructional purposes. It is unnecessary to teach these methods of preparation to every pupil, but instructors (and men being trained as instructors) must have a thorough knowledge of this column in order to teach the correct immediate action.

As pupils at this stage have a thorough knowledge of the mechanism of the gun, it should be unnecessary to go into details of mechanism during the teaching of immediate action. This table has therefore been abbreviated accordingly.

Position of Crank Handle.	Immediate Action.	Probable Cause.	Prevention of Occurrence.	Method of Preparation for Instructional purposes.
First. 	A. Pull back crank handle on to roller. Let go. **Relay.** Fire.	A. (1) Defective ammunition :— Weak charge. Deteriorated ammunition. (2) Tight packing in links.	A. (1) Cannot be provided against. (2) Correct gauging of ammunition and links.	*Off Range* :— A. Insert belt in feed block. Half load. Hang lock. Push belt into correct position in feed block.
	B. If failure recurs, repeat A till gun is warm.	B. Excessive friction, due to congealed oil.	B. Fire occasional bursts.	B. Hang lock, Push belt into correct position in feed block..
	C. Stoppages arising from causes given in this group cannot be remedied in the air.	C. (1) Strong fusee spring. (2) Worn barrel. (3) Friction on working parts.	C. A high standard of training of armourers and gunners should prevent these from occurring.	*On Range* :— Increase weight of fusee spring.

Second. 	Raise rear cover. Place Foroto spring on crank handle. Draw back crank handle. Clear face of extractor with butt end of clearing-plug. Close rear cover. Release crank handle from Foroto spring. Half load. **Relay.** Fire. *Note.*—Should separated case be left in chamber the resulting stoppage would make it necessary for firer to break off the fight.	(1) Separated case, due to insufficient support of lock on base of cartridge. The front portion of the cartridge case is telescoped on to next cartridge. (2) Bulged cartridge. *Note.*—This is impossible with the Prideaux link.	(1) Careful gauging of length of connecting rod before flight. (2) Careful inspection and testing of ammunition before flight.	*Off Range* :— Insert belt in feed block. Raise cover. Lift lock. Place dummy cartridge (with separated case securely telescoped on its shoulder) between projections of gib. Replace lock. Lower rear cover. Let go crank handle. Push belt into correct position in feed block. *Note.*—The only certain way to set up this stoppage is to use a dummy with a front portion of a separated case soldered on it. *On Range* :— File a cartridge about 1 inch from the base, and insert in the belt. Care must be taken that the cartridge is not filed too far through, as there is danger of the bullet being left in the barrel.

Position of Crank Handle.	Immediate Action.	Probable cause.	Prevention of occurrence.	Method of Preparation for Instructional purposes.
Third. 	A. Strike down crank handle. **Relay.** Fire. (Should stoppage recur, repeat this immediate action till gun is warm.)	A. (1) Excessive friction, due to congealed oil. (2) Friction on lock, obstructing upward movement of extractor.	A. (1) Fire occasional short burst during flight, while not in action. (2) High standard of training of armourers (inspection of lock).	*Off Range :—* A. Insert belt in feed block. Fully load, using loading handle, easing it on second motion so as to leave crank handle in third position.
	B. If A fails :— Engage Foroto spring on crank handle. Slightly raise crank handle if necessary. Push belt into correct position in feed block. Disengage Foroto spring. Strike down crank handle. **Relay.** Fire.	B. (1) Slight cross-feed. (2) Slightly misshapen link.	B. (1) Correct loading action. (2) Inspection of links while filling belts.	B. Insert belt in feed block. Half load. Hang lock. Raise rear cover. Push next round halfway into position in feed block. Close cover. Let crank handle go slowly forward, and tap lightly.

				C. As for A.
	C. If A and B fail, and pawls of feed block are protruding :— Engage Foroto spring on crank handle. Draw back crank handle. Raise rear cover. Clear face of extractor. Remove first round in feed block, using jamb clearer. Close rear cover. Release crank handle from Foroto spring. Half load. **Relay.** Fire.	C. Double feed, due to bad loading.	C. High standard of training in loading gun.	C. Insert belt in feed block. Half load. Hang lock. Draw back recoiling portions twice. Let crank handle go forward. *On Range :—* A. Set up as in "Off range." B. Use a belt filled in a slightly incorrect manner, or bend a link. C. Set up as in C above.

Position of Crank Handle.	Immediate Action.	Probable Cause.	Prevention of Occurrence.	Method of Preparation for Instructional purposes.
Fourth.	A. Half load. **Relay.** Fire. B. If A fails :— Unload. Change lock. Reload. **Relay.** Fire. *Note.*—When using a CC gear, a No. 4 stoppage may occur owing to lack of pressure in reservoir. I.A. would be to pull up reservoir handle and let go.	A. Misfire (defective ammunition). B. (1) Damaged or broken firing-pin. (2) Broken lock spring.	A. B. No means of detection.	*Off Range* :— A. Fully load. Press thumb-piece. B. As for A. Instructor states "Gun does not fire." *On Range* :— A. Insert dummy cartridge in belt. B. Insert two dummy cartridges in the belt in succession.

The following would cause prolonged stoppages:—

(1) Loose or broken muzzle cup.
(2) Broken gib or gib-spring.
(3) Broken fusee or fusee spring.

In the event of these stoppages, the firer would be compelled to break off the fight.

The following causes might bring about a run-away gun:—

(1) Broken nose of trigger.
(2) Broken bent of tumbler.

In the event of these happening, the gun would fire automatically, without being controlled by the gear. The remedy would be to ease down the loading-handle slightly. This would stop the gun from firing, since the front portion of the handle comes in contact with the crank handle, thus giving a No. 3 stoppage. Where the loading-handle is not fitted, it would be necessary to open the ammunition chute, force the jam clearer between two cartridges in the belt, and so stop the gun.

Note:—*Immediate Action on the Range.*

When instruction in Immediate Action is being carried out on the range, it is important that the firer should be seated in the same position as when in an aeroplane. Dummy nacelles, representing various types of machine should therefore be constructed.

The object of this is to accustom the firer to manipulating the loading-handle, aligning the sights on a mark, and applying the correct Immediate Action, from exactly the same position as he would occupy in a machine.

IX.—INSTRUCTION IN CAUSES OF STOPPAGES AND SETTING UP GUN.

Before this subject is attempted, the students must have a thorough knowledge of mechanism, and must know how to apply the correct Immediate Action in the event of a stoppage. The instruction should then proceed on the following lines:—

(*a*) *Demonstration:*

Instructor sets up gun to represent a particular stoppage.

Example: First position, Column 5, Table of Immediate Action.

After setting up gun, instructor raises rear cover.

(b) *Explanation:*

One round on face of extractor, the empty case having fallen off.

The horns of the extractor are engaged on the steps of the cams.

The lock has been taken forward by the fusee spring before the horns of the extractor have been able to clear the cams.

NOTE.—The remedy to be applied in the event of this stoppage has already been taught, and only needs to be applied, without detail.

(c) *Squad practice:*

Each member of the class sets up the stoppage, and explains what his actions represent.

(d) *Interrogation.*

Each step in the preparation of stoppages, as given in Column 5, Table of Immediate Action, should be taken in turn, the method and sequence shown above being adhered to throughout the teaching.

X.—EXAMINATION OF GUN.

1. Kit required for Teaching .
2. General Remarks.
3. Muzzle Attachment (Outer casing).
4. Muzzle Cup.
5. Ring Sight.
6. **Steam Tube.**
7. Bead Sight.
8. Rear Cover Lock.
9. **Safety Catch.**
10. **Firing Lever.**
11. **Trigger Bar and Spring.**
12. Fusee Spring and Fusee.
13. Recoiling Portions.
14. Connecting Rod.
15. Lock.
16. **Sliding Shutter.**
17. Barrels.
18. Packing.
19. Axis Pins, etc.
20. Spare Parts.
21. Links.

1. KIT REQUIRED FOR TEACHING.

Gun and Mounting.
Spare Parts complete.
Spare Barrel.
Links.

2. GENERAL REMARKS.

It is important that not only should machine guns be examined when first taken over, but frequent examinations of guns and mountings are also necessary. The gun should be examined daily, as stated in "Care and Cleaning," and a more detailed examination should be made occasionally, as required.

The method and sequence of instruction will be the same as for all other subjects, whenever the sub-head being dealt with permits. The work will therefore take the form of:—

(a) *Demonstration.*
(b) *Explanation.*
(c) *Squad practice.*
(d) *Interrogation.*

3. MUZZLE ATTACHMENT (OUTER CASING).

(*a*) See that the disc is in good condition and clean.
(*b*) See that it is free from burrs and fouling.

4. MUZZLE CUP.

(*a*) This should be clean and free from rust.
(*b*) See that the thread is not burred.
(*c*) See that there are no signs of flaws.
(*d*) See that the ·05 washer is in correctly.

5. RING SIGHT.

(*a*) See that this is firmly fixed, and in correct position with regard to eye.
(*b*) See that it is not distorted.

6. **Steam Tube.**

(*a*) **See that the keeper screw is in the correct position.**
(*b*) **See that the slide valve moves freely. This can be ascertained by giving the gun a rocking motion, when the movement of the valve should be distinctly heard.**

7. Bead Sight.

(*a*) See that this is firmly fixed.
(*b*) See that this is correct in height.

8. Rear Cover Lock.

(*a*) The rear cover should fasten automatically when lowered.
(*b*) The cover lock screwed axis pin should be fully screwed home.

9. **Safety Catch.**

(*a*) **See that spring and catch work automatically.**

10. **Firing Lever.**

(*a*) **See that the firing lever cannot be pressed home unless the safety catch is raised.**
(*b*) **See that the trigger is released before the firing lever bears against the stop on the safety catch, when the latter is raised.**

11. **Trigger Bar and Spring.**

(*a*) **The trigger bar spring should be tested to see that it sends the trigger bar quickly forward. (This can be done by hand.)**
(*b*) **Inspect trigger bar for roughness and burrs.**

12. Fusee Spring and Fusee.

(*a*) See that the claws of the spring are in good condition.
(*b*) See that the threads of the adjusting screw are in good order.
(*c*) See that the vice pin is not bent.
(*d*) Test the weight. (To weigh and adjust, *see* "Repairs and Adjustments.")
(*e*) See that the fusee and chain are in good condition.

13. Recoiling Portions.

(*a*) Remove the fusee spring and work the recoiling portions backwards and forwards. If they move freely, they are correct. (For method of weighing, *see* "Repairs and Adjustments." If not, look for the following:—

(i) Too tight packing.
(ii) Dented side of breech casing and consequent bearing on inside plates.
(iii) Slightly bent or damaged inside plates.

14. Connecting Rod.

Examine as detailed in "Repairs and Adjustments."

15. Lock.

A. *Side and Extractor Levers:*
(*a*) Remove feed block, and keep front cover raised.
(*b*) Draw back crank handle, and let it go slowly forward on to check lever.
(*c*) If correct, there should be no vertical play, when the extractor is manipulated by hand, after the lock is home.

B. *Bents of Sear and Firing Pin:*
(*a*) Pull crank handle on to roller.
(*b*) **Press thumb piece, and, while maintaining pressure, let crank handle go slowly forward on to check lever.**
(*c*) The extractor should be up at its highest point before the sear releases the firing pin.

C. *Extractor:*
(*a*) Remove lock.
(*b*) Examine face of extractor for burrs and flaws.
(*c*) Try grooves with armourer's dummy, to see if cartridge would be held horizontally.
(*d*) Test gib and spring.

D. *Nose of Trigger and Bent of Tumbler.*
(*a*) Fully cock lock.
(*b*) Release sear; the firing-pin should be held back.

E. *Firing-Pin:*
(*a*) See that the point is not broken.

A broken firing-pin can be recognised, without stripping the lock, by releasing the lock spring, with the extractor up. If correct, the firing-pin will then protrude from the firing-pin hole, and can be withdrawn by raising the tail of the tumbler. If it does not protrude, or, if protruding, its point is not withdrawn when the tail of the tumbler is raised, some part of the firing-pin is broken.

Note.—This should be done with the extractor in a vertical position.

F. *Lock Spring:* Test the weight as follows:—
(*a*) Fully cock lock.
(*b*) Place bottom of lock on a flat surface.
(*c*) Place loop of spring balance over side lever head, and left hand on the top of the lock.
(*d*) Draw side lever head upwards with spring balance; when tumbler commences to move, the spring should record 14 lbs.

16. Sliding Shutter.

(*a*) The sliding shutter should not require any undue effort to move it by hand. If it does, look for:—

(i) Dirt or grit.

(ii) Dented bottom plate, probably due to the dropping of the connecting rod on to it when the lock is out of the gun.

(*b*) See that the catch and spring work automatically.

17. Barrels.

For daily examination, use of the mirror reflector is sufficient, but the only certain way is to carefully examine the barrel with the naked eye. The barrel should be carefully inspected for rust, cuts, erosion, nickelling, cord wear and bulges. Proceed as follows:—

(*a*) Remove barrel from gun.

(*b*) Put the breech end close to the eye, and move the barrel with a slightly circular movement.

(*c*) Put the breech end about 10 inches from the eye, and move the barrel with a slightly circular movement.

(*d*) Reverse the barrel, and examine carefully from the muzzle end in a similar manner.

(*e*) See that the threads on the barrel are not burred.

Note.—The spare barrel also should be examined in the manner described.

18. Packing (Ground Work).

The barrel bearings should be packed so that there is no leakage when the barrel casing is filled with water.

(N.B.—This package is just as necessary in aerial as in ground guns.)

19. Axis Pins, Etc.

See that all axis pins are correct; also chains securing component parts.

20. Spare Parts.

(*a*) See that they are correct as regards number and condition.

(*b*) See that they are clean and free from rust.

21. Links.

(*a*) See that these are correct in shape.

XI.—REPAIRS AND ADJUSTMENTS.

1. Kit required.
2. General remarks.
3. Instructions for fitting a new disc to the muzzle attachment.
4. Instructions for weighing and adjusting the fusee spring.
5. Instructions for weighing the recoiling portions.
6. Instructions for testing and adjusting the length of the connecting-rod.
7. Instructions for the renewal of packing.
8. Instructions for various repairs to the lock.

1. Kit Required.

(*a*) Gun and tripod.

(*b*) Spare parts box and case complete.

2. General Remarks.

(*a*) It is necessary that all machine gunners should be able to carry out any of the minor repairs enumerated here.

(*b*) Whenever possible, the subject must be taught in the same method and sequence as is laid down for the teaching of other subjects.

3. Instructions for Fitting a New Disc to the Muzzle Attachment.

Unscrew the front cone.

Cut the front bevel of the disc, driving sufficient metal up to provide a hold for the pliers.

Remove the disc, and replace it with a new one.

When assembling a new disc, it may be necessary to tap it lightly, to ensure a permanent fit.

4. Instructions for Weighing and Adjusting the Fusee Spring.

Take out the lock.

Place the loop of the spring balance over the knob of the crank handle.

Standing on the left side of the gun, press down the check lever with the left hand.

Pull the balance vertically upwards, resting the wrist on the breech casing.

The reading indicated when the crank handle commences to move will be the weight of the fusee spring.

The tension of the fusee spring should be such as to obtain the maximum fire efficiency of the gun, viz., 600 rounds per

minute. This tension should, however, not exceed 12 lbs.

If the spring is over, or not up to weight, adjust by means of the vice pin. Generally six clicks (three revolutions) make a difference of about 1 lb. Turning the vice pin in the direction of the hands of a watch decreases the weight, and *vice versâ*.

5. Instructions for Weighing the Recoiling Portions.

Remove fusee spring.

Place crank handle nearly vertical.

Place loop of spring balance over shaft of crank handle, and pull slowly to the rear.

For aerial purposes the weight should not exceed 2 lbs.

6. Instructions for Testing the Length of the Connecting Rod.

Remove fusee spring.

Raise rear cover and pull crank handle on to roller.

Insert on extractor, opposite firing-pin hole, an armourer's dummy, placing it into position through the opening in the underside of the breech casing.

Lift extractor up to its highest point.

See that the barrel is home.

Turn crank handle towards check lever.

Guide armourer's dummy into chamber.

Push check lever back just clear of crank handle, and let crank handle gently down towards rest.

If connecting rod is of correct length, a check will be felt just before crank handle reaches check lever. If no check is felt, the lock is not fully home (*i.e.*, the connecting rod is not long enough). In this case it must be lengthened in accordance with instructions given below.

Instructions for Adjusting the Length of the Connecting Rod.

Remove fusee spring.

Take out lock.

Determine the number of No. 1 or No. 2 washers (or both) required, to correct the length of the connecting rod, by first placing a No. 1 on the outer face of the adjusting-nut on the connecting rod, replacing the lock and re-testing the length, adding washers and again re-testing as may be necessary. When the correct length has been determined, the washers which have been placed on the outer face of the adjusting nut must be assembled permanently on the shoulder of the connecting rod and secured by the nut. To do this, turn the connecting rod back on to the trigger bar lever unscrew the adjusting nut with the combination tool, and remove it.

Place the washers on the connecting rod and screw the adjusting nut tightly home on the washers. Re-test, to ensure that the adjustment is correct.

Note.—Two sizes of washers, ·003 and ·005 of an inch are issued, to enable the connecting rod to be adjusted finely. The No. 1 ·003-inch washer has one hole punched in the rim, and the No. 2 ·005-inch washer has two holes in the rim. By the use of these sizes in combination, the following adjustments, 3, 5, 6, 8, 9 and 10 thousandths of an inch can be made. The adjustment is commonly made with the two washers together. This is sufficient as a purely temporary measure, but a finer adjustment might subsequently be made. It is not necessary for any mechanical reason for the two washers always to be used together.

7. Instructions for the Renewal of Packing.

(a) *At the Breech End of the Barrel:*

Strip the gun and take the recoiling portions out.

Wind a strand of asbestos (part of a 5 yards piece) in the cannelure of the barrel, pressing it together with a thin piece of wood or the point of a screwdriver or knife, until the cannelure is full.

Smooth down flush with the barrel.

Oil the asbestos.

Re-assemble parts.

(b) *At the Muzzle End of the Barrel:*

Remove the muzzle attachment outer casing.

Unscrew muzzle cup.

Unscrew the gland, and repack, or (if necessary) replace the asbestos, having first oiled it, by winding it loosely round the barrel; whilst winding, push it in with a No. 3 punch, a piece of wood, or any blunt-ended instrument which will fit.

Screw on the gland as tightly as can be done by hand.

Hang the lock.

Work the recoiling portions backwards and forwards to ensure that they move freely.

If the packing is found to bear too hard on the barrel, the gland should be removed and one or two strands taken out of the asbestos.

8. Instructions for Various Repairs to the Lock.

The lock should be stripped (in accordance with instructions already laid down) until the faulty part is reached, when it should be replaced, and the lock assembled as detailed.

XII.—THE TESTING OF AMMUNITION.

Importance of Subject.

In the early days of aerial warfare gun stoppages were largely due to bad ammunition. As stoppages in the air are a very serious matter it was eventually decided to manufacture special ammunition for the R.F.C. This is now done, but for further security every round should be carefully tested before use.

Defects Looked for in Ammunition.

The defects for which ammunition is examined are:—

(1) Cracks round the indents which join the case to the cannelure of the bullet.
(2) Faulty diameter (bulged round).
(3) Length of cartridge under or over gauge.
(4) Thick rim.
(5) High set cap.
(6) Deep set cap.
(7) Loose bullet.
(8) Any unusual feature.

Method of Testing.

(See diagram opposite.)

For testing purposes the following plan will be found useful. A new barrel should be sunk into the bench. Near to it should be screwed the extractor of a Vickers gun lock, face upwards, and having the gib and gib-spring removed. Above the extractor should be placed an arch gauged to the standard length of a cartridge. (For teaching purposes, this apparatus may be arranged on a small block of wood.) After the cartridge has been inspected with the eye, it should be dropped into the barrel, to test its diameter. It should then be removed, and slipped along the grooves of the extractor, to test the rim. This process tests the length of the cartridge at the same time as the rim, and also probably reveals any case of high set cap that may have escaped notice. While the cartridge is being passed through the cartridge grooves it should be turned round, so that every part of the rim is tested.

If these tests are properly carried out, the only gun stoppages likely to occur through ammunition are those due to a badly-drawn case or a weak charge, both of which only become obvious when the cartridge is fired.

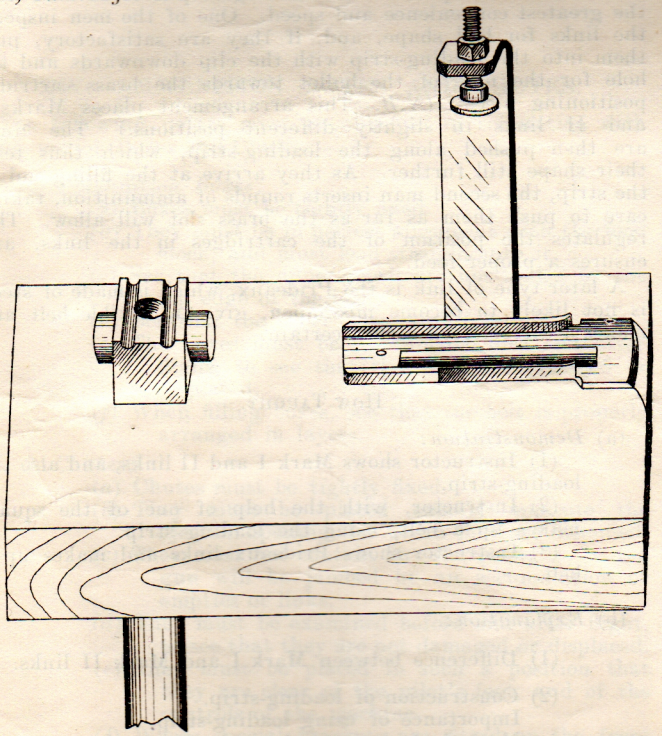
How Taught.

(a) *Demonstration:*
Instructor exhibits testing apparatus, and shows how to inspect and test a round.

(b) *Explanation:*
The necessity for the careful testing of ammunition.
The various defects looked for, and the manner of testing for them.
How a simple testing apparatus may be made.

(c) *Squad practice:*
Each member of the squad tests rounds of ammunition, explaining meanwhile the purpose of his actions.

(d) *Interrogation.*



XIII.—THE PREPARATION OF BELTS AND USE OF THE LOADING-STRIP.

Only good ammunition and sound links should be used. The ammunition should have been tested as laid down in "The Testing of Ammunition": the links (Marks I and II) are tested in the process of making up a belt, if the loading-strip is used.

The method of procedure in this case is as follows:—

Two men are required if the loading-strip is to be used with the greatest convenience and speed. One of the men inspects the links for bad shape, and, if they are satisfactory, puts them into the loading-strip with the clip downwards and the hole for the nose of the bullet towards the brass cartridge positioning piece. (*N.B.*—This arrangement places Marks I and II links in slightly different positions.) The links are then pushed along the loading-strip, which thus tests their shape still further. As they arrive at the filling-end of the strip, the second man inserts rounds of ammunition, taking care to push them as far as the brass slot will allow. This regulates the position of the cartridges in the links, and ensures a proper feed.

A later type of link is the Prideaux, which is made of steel, is not likely to become misshapen, gives a flexible belt and makes a correct feed almost certain.

How Taught.

(a) *Demonstration:*

(1) Instructor shows Mark I and II links, and also the loading-strip.

(2) Instructor, with the help of one of the squad, makes up a belt, using the loading strip.

(3) Instructor shows Prideaux links and makes up a belt.

(b) *Explanation:*

(1) Difference between Mark I and Mark II links.

(2) Construction of loading-strip.
Importance of using loading-strip.
Method of placing links in loading-strip.
Method of making up a belt.

(3) Advantages of Prideaux link.

(c) *Squad practice:*

Each member of the squad:—

(1) Describes Mark I and Mark II links.

(2) Describes loading-strip and make up belt—the latter to be done with the help of the next man of the squad in every case.

(3) Describes the Prideaux link and shows how it is advantageous.

(*d*) *Interrogation.*

Note.—The importance of this subject cannot be too thoroughly impressed on all students, as neglect of the above will hinder the automatic feed of the guns in the air, and may entail serious consequences.

XIV.—AMMUNITION BOXES AND CHUTES.

The following points must be observed in connection with Ammunition Boxes and Chutes:—

1. *Ammunition Boxes:*
   - (*a*) Boxes must be tightly fixed.
   - (*b*) They must be in perfect alignment with the feed block, and must lead straight into it.
   - (*c*) See that the upper pawls are not fouled by the top edge of the box.
   - (*d*) See that the roller is working freely.
   - (*e*) The boxes must be examined before and after flight, to see that they are not damaged or displaced.
   - (*f*) When filling boxes, see that the belt is properly arranged in layers.

2. *Chutes:*
   - (*a*) Chutes must be tightly fixed.
   - (*b*) They must be placed exactly opposite the ejection openings for which they are intended.
   - (*c*) They must not contain any sharp angles, or the gun will be jambed by an accumulation of empties or links.
   - (*d*) They must be examined before and after flight, to see that they are not damaged or displaced.
   - (*e*) They must be placed in such a position that they are clear of the pilot's feet, and of the controls of the machine.
   - (*f*) Where special brackets are fitted on the front cover of the gun, care should be taken to see that the rivets do not foul the upper lever of the feed block.

How Taught.

(a) *Demonstration:*
The instructor exhibits box or chute, and, if possible, shows it fitted in position in a machine.

(b) *Explanation:*
The instructor explains the various points as indicated above, showing the reason for each.

(c) *Squad practice:*
Each member of the squad goes through the Points to be Observed, as the instructor has done.

(d) *Interrogation.*

Spanner

Com Tool ☐ for Mark I Muzzle cap
for adjusting connecting Rod.

Hyland loading handle

Scrotes joint cleaner.

Cleaning plug. for separated case
& cleaning firing extractor.

6 Steel discs.

3 Locks (D.P.

1 Brass instructional lock.

1 Spare feed block

Punches. No 3 & 5

For feed block use punch. not T pin

No 3. (pin on collar).
(" " check lever)

T fix pin

Deflector

Pull through

2 Fuses & chain

Ex lever right & left.

·005 washer (2 holes)
·003 " (1 ")

Springs Trigger bar
Sliding cover
Front cover catch
Plunger with knob
Plug " Clearance for
Screw driver

Plunger fits feathers in cylinder

S.a.a. AP (armour piercing)

S.a.a. P.S.A. Mark VII Impact
Det. 30 gr. F.M. Mk in VII AA (Pomeroy)

(Brock) B.I.K. VII Mk in VII K.

S.P.G. Tracer. VII Mk in VII. G.

S.a.a. B.F. work VII Mk in B

R.T.S. (Special Barrel.

cap

Incendiary. Blue
Impact Orange
Tracer Red.
Armour Piercing Green.
Ordinary Black.

1248 rounds in 36 Boxes of 48 each.

Box S.a.a. 1000 rounds.

768 in 16 card cases.

115 rounds in Bundles

Labels. Group. Div.

AFam 5

1. Training argument

Cooperation

Deduction

Free will man highest standard

Lust